

What is claimed is:

- 1 1. Chemical vapor layer deposition apparatus comprising:  
2  
3 first and second precursor gas sources, first and second valves connected to  
4 said first and second precursor gas sources;  
5  
6 a purge gas source, said purge gas source having a third valve, said valve  
7 permitting inert gas flow, first and said second precursor gas sources and said  
8 purge gas operate sequentially to define a deposition cycle,  
9  
10 a reaction chamber, said reaction chamber being connected to said first, said  
11 second, and said third valves;  
12  
13 a trap connected to said reaction chamber; said trap having an inlet and an  
14 outlet, said inlet being connected to said reaction chamber, said trap having a  
15 residence time at least equal to one deposition cycle; and  
16  
17 a backing pump connected to said outlet of said trap and to exhaust.
- 1 2. Apparatus as recited in claim 1 in which said inlet and said outlet are at the  
2 top of said trap.
- 1 3. Apparatus as recited in claim 2 further comprising:  
2  
3 a process pump, said process pump being connected between said inlet of  
4 said trap and said reaction chamber.
- 1 4. Apparatus as recited in claim 1 in which said residence time is greater than  
2 said deposition cycle.

1 5. Apparatus as recited in claim 3 in which said trap further comprises:

2

3 a heater.

1 6. Apparatus as recited in claim 3 in which said trap further comprises:

2

3 an electrode in said trap;

4

5 and a ground connection to said trap.

1 7. Apparatus as recited in claim 1 further comprising:

2

3 a surge flow suppresser connected to said outlet of said trap.

1 8. Atomic layer deposition apparatus comprising:

2

3 first and second precursor gas sources, first and second valves connected to  
4 said first and second precursor gas sources;

5

6 a purge gas source, said purge gas source having a third valve, said valve  
7 permitting inert gas flow, first and said second precursor gas sources and said  
8 purge gas operate sequentially to define a deposition cycle,

9

10 a reaction chamber, said reaction chamber being connected to said first, said  
11 second, and said third valves;

12

13 a trap connected to said reaction chamber; said trap having an inlet and an  
14 outlet, said inlet being connected to said reaction chamber, said trap having a  
15 residence time at least equal to one deposition cycle; and

16

17 a backing pump connected to said outlet of said trap and to exhaust.

1 9. Apparatus as recited in claim 8 in which said inlet and said outlet are at the  
2 top of said trap.

1 10. Apparatus as recited in claim 9 further comprising:  
2  
3 a process pump, said process pump being connected between said inlet of  
4 said trap and said reaction chamber.

1 11. Apparatus as recited in claim 8 in which said residence time is greater  
2 than said deposition cycle.

1 12. Apparatus as recited in claim 8 in which said trap further comprises:  
2  
3 a heater.

1 13. Apparatus as recited in claim 8 in which said trap further comprises:  
2  
3 an electrode in said trap;  
4  
5 and a ground connection to said trap.

1 14. A method of atomic layer deposition comprising the steps of:  
2  
3 sequentially flowing first and second precursor gases into a reaction chamber;  
4  
5 flowing a purge gas into said reaction chamber after said first and after  
6 second precursor gases, the flowing of said first and said second precursor  
7 gases and said purge gas forming a deposition cycle; and  
8  
9 removing the gaseous effluent from said reaction chamber in a trap, said  
10 removing including trapping the gaseous effluent in a trap, said gaseous

11 effluent having a residence time in said trap at least equal to said deposition  
12 cycle.

1 15. A method as recited in claim 14 in which said removing further comprises:  
2  
3 pumping said gaseous effluent with a backing pump after said trap.

1 16. A method as recited in claim 14 in which said removing further comprises:  
2 pumping said gaseous effluent with a process pump prior to said trap.

1 17. A method as recited in claim 14 in which said residence time is greater  
2 than said deposition cycle.

1 18. Deposition apparatus comprising:  
2  
3 first and second precursor gas sources, first and second valves connected to  
4 said first and second precursor gas sources;  
5  
6 a purge gas source, said purge gas source having a third valve, said valve  
7 permitting inert gas flow, first and said second precursor gas sources and said  
8 purge gas operate sequentially to define a deposition cycle,  
9  
10 a reaction chamber, said reaction chamber being connected to said first, said  
11 second, and said third valves; and  
12  
13 a trap connected to said reaction chamber; said trap having an inlet and an  
14 outlet, said inlet being connected to said reaction chamber, said trap having a  
15 residence time at least equal to one deposition cycle.

1 19. Apparatus as recited in claim 18 further comprising:  
2  
3 a backing pump connected to said outlet of said trap and to exhaust.

1 20. Apparatus as recited in claim 18 in which said inlet and said outlet are at  
2 the top of said trap.

1 21. Apparatus as recited in claim 19 further comprising:  
2  
3 a process pump, said process pump being connected between said inlet of  
4 said trap and said reaction chamber.

1 22. Apparatus as recited in claim 18 in which said residence time is greater  
2 than said deposition cycle.

1 23. Apparatus as recited in claim 18 in which said trap further comprises:  
2  
3 a heater.

1 24. Apparatus as recited in claim 18 in which said trap further comprises:  
2  
3 an electrode in said trap;  
4  
5 and a ground connection to said trap.

1 25. Apparatus as recited in claim 18 further comprising:  
2  
3 a surge flow suppresser connected to said outlet of said trap.  
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